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ABSTRACT

The aim of this paper is to give some insight into what academic simulation games are, what their goals are, how they accomplish these goals, and how they differ from other ways of teaching and learning. A game is a way of partitioning off a portion of action from the complex stream of life activities. It partitions off a set of players and allowable actions, a segment of time, and establishes a framework within which the action takes place. The game can even be described as a minute social system, and is therefore an important part of the socialization of children. The kind of learning that can go on in a game, is complimentary to, and prior to, the kind of learning that occurs in the standard information transmission model of school learning. Learning in a game is the development of affect toward a new goal; and the transmission of knowledge that occurs in an ordinary classroom is a way of facilitating action toward that goal. The game provides the structure which Jerome Bruner argues is so important to retention and usability of information. In the social studies, a game provides such a structure for action with the most direct impact upon children described as unmotivated. One of the games developed by the Johns Hopkins Games Project gives some idea of what such games are and do. (Author/SBE)

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ACADEMIC GAMES AND LEARNING

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My aim in this paper is to give some insight into what academic simulation games are, what their goals are, and how they accomplish these goals. I want to describe how simulation games differ from other ways of teaching and learning--both in the way children learn from them, and in the kinds of things they learn. As will become evident, these differences are sharp ones indeed, and I will count it sufficient achievement to do no more than communicate them.

The Relation between Games and Learning

A "simulation game" combines the properties of games in general with the properties of simulations in general. The essential properties of a game for present purposes are these: (1) Its basic elements are players or actors, each striving to achieve his goal; (2) it is limited to a small, fixed set of players; (3) its rules limit the range and define the nature of legitimate actions of the players; (4) again, through the rules, it establishes the basic order, sequence, and structure within which the actions take place; (5) it is delimited in time as well as extensivity, with an end defined by the rules; and (6) its rules constitute a temporary suspension of some of the ordinary activities of life and rules of behavior by substituting for them these special time-and-space delimited ones.

In short, a game is a way of partitioning off a portion of action from the complex stream-of-life activities. It partitions off a set of players, a set of allowable actions, a segment of time, and establishes a framework within which the action takes place. It established what one might describe as a minute system of activities, and if the game contains more than a single player (as most games do), the game can even be described as a minute social system.

It is undoubtedly for this reason that games are such an important part of the socialization of young children. For the playing of a game allows a child to practice, in this limited framework, action that is interdependent with the actions of others, carried out within a set of rules, and in pursuit of a goal. As Piaget's observations of children playing the game of marbles show, children do not immediately learn the idea of playing a game, and only slowly gain a sense of the nature of its rules. Piaget suggests that the learning of the nature of rules in a game is, in fact, the learning of the nature of a moral order.

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Thus, games may be regarded as a special invention in which children or adults practice with the components of life itself, a kind of play within the larger play of life. Because they are constructed of these components of life, games as means by which children learn deserve more serious attention than they have received. It is true, to be sure, that games are used by teachers in early grades of school, both as general instruments of socialization and as vehicles for teaching certain content. But they are generally regarded as auxiliary aids to the essential task of "teaching," and after the early elementary grades, are forsaken in favor of more serious approaches to teaching.

These more serious approaches to teaching are based on a very different conception of how children can, or perhaps should, learn. This conception is one based on the idea of transmission of knowledge (or skills, or ideas) from a teacher to a student followed, in some cases, by practice of the student in the repetition or use of this knowledge, skill, or idea. It has many variants, including transmission through a variety of media, such as audiovisual aids, books, educational television, and others. But the basic model is the same: a conception of the child as a receptor of knowledge, skills, or ideas transmitted from others.

It is only by contrasting these two models of a learning context that one begins to see the rather peculiar characteristics of this second, or school, model of learning. The school model has none of the remarkable lifelike properties that a game has but appears to be a simplistic use of the fact that information is transmitted by communication, and that repetition aids learning.

The comparison of the school model of learning with experimental and theoretical work by psychologists makes this model appear even more puzzling. In this work, the two essential properties of the learning context are action in an environment and reward; the learner is always learning to act by acting. Furthermore, it is important to note that the learning is incidental to his goal; the goal is not learning itself. The student is motivated to receive the reward; he learns a given action only because it is this action that gains him the reward.

The learning that occurs is a kind of "learning to be motivated" in a given direction, learning to generalize his affect from one stimulus or environment context to another. Once he has "learned" or "become motivated," then he may pick up more and more information about the new environmental context that enables the action to take place more efficiently, and certainly this might be called learning as well. But the essential step is the development of affect toward the new environmental context, or to put it another way, learning to be motivated--i.e., to act, in a new direction.

This language contrasts sharply with that used to describe the classroom. When children fail to "learn their lessons," it is often said that they are "not motivated to learn," and consequently cannot be taught. The task is regarded as one of "teaching" children after they have already been motivated. Thus, while psychologists consider the most essential step as learning to be motivated to act in a given direction, to achieve a given goal, the school is seen to operate under the assumption that a child is already motivated to learn mathematics or history or English literature. Consequently, all that is necessary for the teacher is to provide that information that facilitates his movement toward these goals. Obviously the child will assimilate it because--the implicit argument goes--the information he has been provided with does indeed facilitate reaching that goal.

Viewed in this light, it becomes much more evident why variations in school seem to have so little effect on what a child learns compared with variations in his family background. For if the essential learning task is that of transfer of affect--or learning to be motivated (that is, to act) toward the object--then this has been carried out in the home prior to, and concurrent with, the school, but not within the school.

There is, of course, one way that schools give many children a motivation that partially coincides with the goal of learning mathematics or history or

English literature. This is by establishing grades and a diploma. The child in many homes "learns to be motivated" toward the goal of good grades by his parents' ability to transfer his affect to this goal. But as every teacher knows, this goal is only partially coincidental with that of knowing mathematics, or history, or English literature. Moreover, not every child is given this goal by his family.

In short, it appears that the usual conception of the school's task leaves out the most crucial step in learning: the necessary and almost sufficient condition of developing strong affect toward goals that require the content the school teaches--that is, learning to act toward these goals.

It is within this framework that I want to examine the characteristics of games as learning tools. For I suggest that playing a game with a given content has precisely the effect of "learning to be motivated" toward assimilating that content. The game provides the goal for which the content is relevant, and the very nature of games insures that the player will be motivated toward that goal. I suggest that the game fulfills precisely the step that is missing in the usual conception of a school's task--the learning that leads a child to actively assimilate the information transmitted to him in school. It is true that some good teachers, particularly those in elementary grades with enough time to give attention to individual children, recognize the need for this step, and by improvising, attempt to carry it out. But the essential formal task of the teacher is seen according to the simplistic model described earlier: "teaching" by transmitting information. If my points above are correct, then providing such information is only the second step; the first is to bring about the true learning--the learning to act or be motivated toward a goal which the information facilitates.

The kind of learning that can go on in a game, then, is complementary to, and logically prior to, the kind of learning that occurs in the standard information-transmission model of school learning. Learning in a game is the development of affect toward a new goal; and the transmission of knowledge that occurs in an ordinary classroom is a way of facilitating action toward that goal. From this perspective, and I suggest from the learner's perspective as well, he is not carrying out actions in order to assimilate the material presented to him. It is quite the reverse; he is assimilating the material in order to be able to efficiently carry out actions toward his goal. The goal may be a goal in a game toward which this content is relevant or, less likely, it may be a goal in real life toward which the content is relevant. Most frequently, of course, it is the goal of getting good grades, toward which the content has no logical relevance, but which the school has artificially connected to the content.

This perspective, if correct, implies a number of points about the use of games for learning in schools. First, it implies that the appropriate games for learning are those in which winning, or attainment of the goal, is in fact facilitated by the knowledge that the school is attempting to "teach." Games with goals unrelated to such content will not in themselves make the child "motivated to learn.

Second, the sequence of game-learning and information-transmission should obviously be such that the game is first prior to, and then interspersed with, the information-transmission. For the goal must be learned in order for the information to be relevant, and the goal must persist so that the information continues to be relevant.

Third, this perspective implies something about the relative amounts of attention that the school should give to the two kinds of learning--that is, that the goal-learning should receive the greater amount of time and effort. There are many examples of students avidly seeking out information in order to do better in achieving the goals of a game; but I know of no examples in which students, given new information, go out and seek goals which this information could facilitate. Incidentally, this appears to be the principal reason that graduate school training is a remarkably affective resocialization process. The activities of the faculty are designed more to induce motivation toward new goals than they are to transmit information. In a good graduate department, the students get the information on their own, once they have learned motivation toward the new goals (a task which is facilitated by the fact that their present teachers are their future colleagues and judges throughout a career).

Fourth, this perspective about goal-learning and information-transmission implies that the most direct and powerful impact of games in schools will be upon children described as "unmotivated." For these children have never learned a goal to which school is relevant. The effect on children who are already "highly motivated" should be more subtle, less directly upon the overall amount of achievement, more on the style of activity and the profile of achievement. For example, games should lead them to a more uneven profile of achievement as they learn one set of goals more fully than another, and thus seek out information on the first more avidly than the second. This subtle effect may, however, have long-run consequences because the goals of a game and the content of school have a direct and logical coherence. The goal of good grades, which motivates most "highly motivated" children, has no necessary relevance to the content of school. Thus, when these children graduate, and the goal of good grades no longer obtains, there is no related goal to support that information and motivate its expansion. The result is not merely that the former students quickly forget information that is irrelevant to their current goals, but something considerably more important: They have never learned a goal at all. One result, of course, is the curious disorientation that occurs for many adolescents at the end of high school, especially for those upper-middle class adolescents who have never learned economic goals from economic necessity.

Games and the Learning of Structure

A second way in which learning through games differs from the school model of learning derives from the properties of games described earlier. A player's role in a game consists of a structure of interrelated actions toward a goal. Learning of this structure of actions, and their relation to the larger structure of actions of all the players, constitutes learning both the whole and the relation between the parts. This structure of action, once learned, becomes a structure to which relevant information is assimilated. Thus the information, when it is assimilated, is not merely "learned"; it is fitted into the structure of action in such a way that it facilitates achieving a goal. Thus the game provides the structure which Bruner argues is so important to retention and usability of information. The structure learned in this way is even more deeply embedded than one that is learned only cognitively.

It is very likely that one reason education in schools proceeds as well as it does in subjects like mathematics is that the school model I've described is

used less often in that subject area. In solving arithmetic, algebraic, and other mathematical problems, the child is himself engaged in a small game with a well-defined goal. He learns mathematical operations through the action of employing them toward that goal. This sometimes fails, of course, because the "game" that is set for him is sometimes too hard, and he never reaches the goal but merely experiences failure; if and when he does reach it, however, the means by which he is learning has many similarities to learning through games.

Games and the Human Sciences

One of the reasons social studies is so poorly taught in high schools is that the schools have few, if any, means for providing the appropriate structure within which it should be learned--a structure of human action. What a simulation game in the area of social studies does is provide such a structure of action, one within which the information the student learns can be located and fixed in his memory. It may well be, in fact, that simulation games are more appropriate to social studies than to other subjects for just this reason. For social studies involves the actions of human actors; and the playing of a game embeds in one's experience that particular structure of action.

Simulation games can also be devised for the physical sciences; but in those disciplines, the relevant actions are those of the physical environment, which can be as well observed in a laboratory experiment as in an interpersonal game. However, the game does lend some things that an experiment does not, such as the added motivation that occurs when a number of persons are striving toward interdependent goals. This motivation is not trivial, as evidenced by the success of some mathematical games, such as Wff-n-Proof, the logic game, and Equations, a game involving the creative use of arithmetic operations. But apart from these values of games in other intellectual domains, the isomorphism between the very structure of games and the human sciences is striking indeed and suggests their special values for these areas of learning.

What is a Simulation Game Like?

One of the games developed and used by the Johns Hopkins Academic Games Project, under a grant from the Carnegie Corporation, should give some idea of what such games are and do. It may be described as a legislative game and is played as follows: A group of 6 to 13 players constitutes a legislature, and the game is a session of the legislature in which eight issues are introduced and voted upon. Each player is dealt cards each of which shows the preferences of his constituents on a certain issue.

Each player has as his goal the simple task of getting reelected. But to accomplish this, he must get as many issues passed (or defeated) as he needs to satisfy the majority of his constituents. The votes for and against him in reelection after the bills are passed are determined by the numbers of his satisfied and dissatisfied constituents and the outcome of each issue as shown on the faces of the cards.

This structure of the game induces, as one might expect, a variety of negotiations, vote exchanges, and bargains of various sorts by each player in order to gain control of the outcome of those issues important to his constituents. Thus,

the principal kind of action that the player engages in is one of the kinds of actions that real legislators engage in. The player comes to see the connection between the legislator's consituency and the legislator's actions and the connection between the legislator's goals of reelection and the kind of behavior he carries out.

A number of points can be made about this game. First, the players learn information relevant to the game: They do not go out and learn information about the content of issues, they go out and learn information about the functioning of a legislative body. (Players have learned, for example, the fine points of Robert's Rules of Order to facilitate their gaining reelection.) Although their interest in the content of the issues is stimulated, and there is evidence that their attitudes change somewhat on these issues, they do not seek cut information on this content. The game that would induce them to seek out such information would be a different game, one in which information about the actual content of the issues facilitated achieving their goals.

A second point is that the structure of this game very selectively abstracts a single process of negotiation and bargaining that occurs in legislatures--an important process, but not the only one. It does so because the learning of this process can occur unencumbered by the additional processes of which real legislatures are composed. The additional processes are learned in a stepwise fashion as each player encounters different levels of the game. At each higher level, an additional process is introduced such as committee structure; introducing the importance of the legislator's own values concerning an issue in addition to his goal of reelection; introducing special powers for the floor leader or chairman; and additional complexities. Thus, the complex structure of a legislature is learned by first analytically separating the various processes in it, and then reconstructing the functioning legislature in a stepwise fashion.

A third point is that the goal of the player in the game, and the constraints on his behavior, are made as nearly like those of the real actor in the situation as possible, subject to the conditions described under the second point above. Thus, the simulated structure of action is designed to mirror, so far as possible, the motives and interests of a real person in such a situation. The structure of action which is learned and which constitutes the framework into which information is fitted is like that in reality. The player, as a consequence, has a natural screening device for information, and a natural basis for choosing what information to seek out. The game is a good simulation of reality because he seeks only the information he would need for acting in this kind of situation. He does not learn the information the teacher says is important or that which he thinks will give him a good grade, but the information he will need for action.

A fourth point is that the general principles exhibited in playing the game are not recognized in verbalizable form by all players. Some players quickly infer the general principle of interdependence between legislators and constituents which makes legislatures function; others do not learn this until discussions following the game. Virtually all understand this after such discussions. But the phenomenon which has been observed in other contexts--that some persons translate their experience into general principles which they can verbalize, while others do not--applies here as well. As a consequence, for many children, a strong, second learning experience occurs in discussions after the game. This point illustrates the more general point made earlier: That play in a game is not

a self-contained learning method but one that is complementary to the verbal discussions and information-transmission of which most school activity is now composed.

A final point about this game and others is the wide range of skill and background they encompass. The game has been played by seventh graders and by graduate sutdents, in identical form. It has been played by students in a ghetto school and has provided the basis for at least two faculty members' theoretical papers on the topic of legislative decisions. This broad span is not merely characteristic of this game but of simulation games in general. The practical implications of this are enormous, of course. Today, the span of ability that can be encompassed by current teaching methods is so narrow that schools must resort to tracing and grouping. The evidence from use of games in the classroom indicates that a much broader span of ability can be usefully encompassed by simulation games.

Conclusion

I want to be very clear about what I am suggesting in this paper concerning simulation games and learning. I am not describing games as a "new teaching device"; I am rather suggesting that the use of games in learning introduces fundamental changes in the nature of the task the school is carrying out; that the use of games means that simulation games are especially appropriate for embedding into experience and cognition the structure of social action on which the human sciences are based. Certain of the details of these arguments may be incorrect; but they constitute a strong challenge to the current teaching activities of schools, especially in the area ordinarily termed social studies.